EXPERT INSIGHT FOR IoT SUBSCRIBERS

Edge Computing is Key for Cellular IoT

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Introduction

Many people in the mobile industry think that "all we need to do is connect gadgets to the Internet" and then the market will ramp up to 20 billion devices. It's not so simple.

So far, we've seen growth to a shipment rate of 170 million Cellular IoT devices for 2019, with a lift of about 80 million LTE-M and NB-IoT devices this year. That's good, but it's not enough to make any impact on the operators' financials.

Looking at it another way, the service revenue for M2M was roughly $25B in 2014, and the rise of Cellular IoT (with improved battery life through Cat-M and NB-IoT) has boosted the service revenue to about $69B this year. Good progress, but the mobile industry takes in about $1.1B annually… so Cellular IoT represents only 6% of the total.

So why do industry pundits focus so much attention on Cellular IoT as it relates to automation and industrial use cases?

Why does Cellular IoT matter?

Looking at the revenue growth opportunity in mobile broadband, we can see that it's limited. Mobile service revenue has grown dramatically through the 1990s and 2000s, but during the 2010s, revenue has stalled. Many major LTE operators are turning to 5G as a way to compete for fixed broadband revenue, hoping to take market share from fixed-broadband competitors. This is a great idea, but will only provide 2-3 years of growth because the revenue in the fixed broadband market is much lower than the mobile market.

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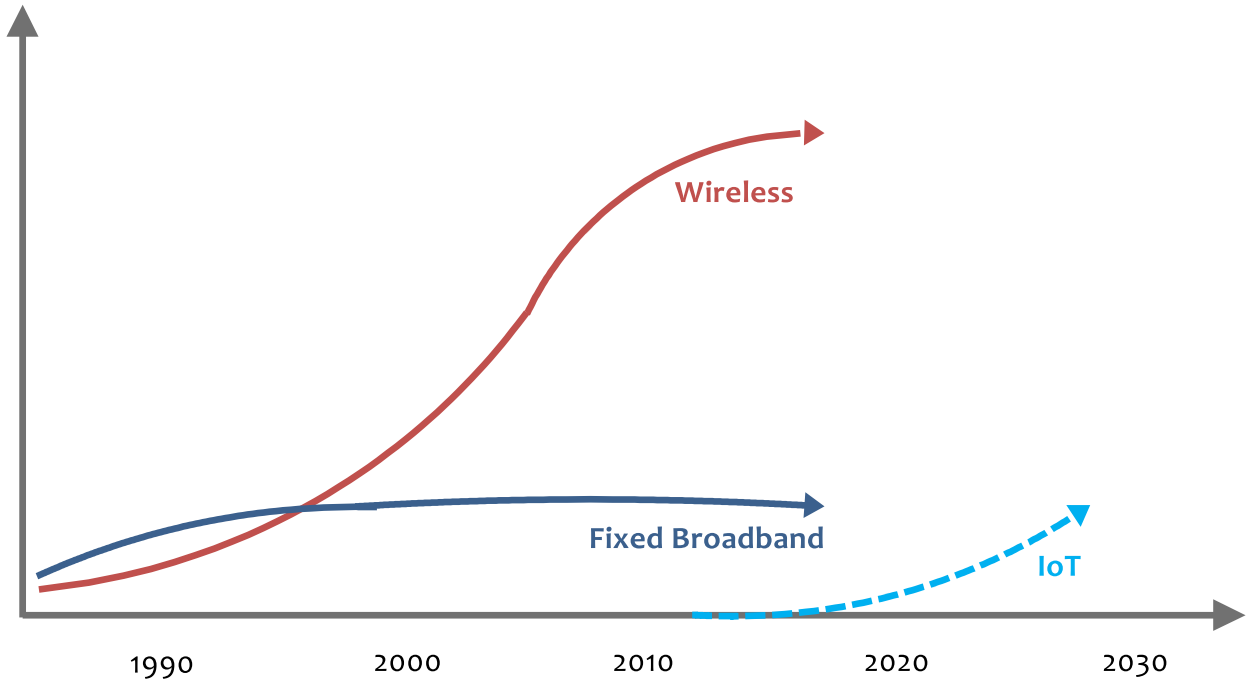

Figure 1: Big-picture revenue profile: IoT is the only growth market

Sources: Mobile Experts

So, if the mobile broadband and fixed broadband markets merge together and total service revenue steps up from $1.1T to $1.3T, then what? Many people assume that between 20 billion and 50 billion devices will be connected, to keep the revenue growth going.

Cellular IoT—What are the important drivers?

We agree that the long-term vision for automation with wireless connectivity holds trillion-dollar growth potential. Our question is about the timing. Ericsson had famously predicted 50 billion devices in 2020, then cut back the number to 20 billion. Well, today we have only 6 months to go before 2020, and our current installed base includes only about 4 billion IoT devices still in operation. (Billions more have been shipped and have been scrapped by now).

The industry will ship 80 million LTE-M and NB-IoT devices this year, so growth is coming along. But what is holding this market back from exploding to billions per year?

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Clearly connectivity is not enough. We've had Cat-M and NB-IoT for two years, and the growth is going okay, but we're not seeing the kind of viral growth that people hoped for. Mobile Experts has interviewed a series of enterprise customers to understand what's missing here.

- Analytics are not in place. Connecting sensors is helpful, but every enterprise has some unique needs for interpreting the data. In some cases, this is highly sophisticated analysis such as facial recognition. In other cases, it's really about simple status updates (if the sensor detects water, show that the tank is full). In all cases, there's a need for platform development and application development that is tailored to specific business needs.
- Automation is not ready for decisions based on IoT sensors. Today, automation is generally self-contained with robotics that use on-board cameras or other sensors to 'see' the environment. Decoupling the robotics from the sensors will happen only with the maturity of IoT platforms that are stable and open.
- Safety issues and legal issues are making progress very slow for applications that happen on public infrastructure such as roadways. Package delivery with drones, self-driving taxis, and other examples of high-level automation will require a long approvals process for government signoff.
- The next level of industrial automation will replace humans who perform complex tasks (construction, manufacturing, process control). Each individual task requires a huge investment in algorithms to control how sensor data is used to direct the actions of robotic controls. This doesn't happen quickly, especially because each task that is automated must justify the investment in automation. We started years ago with automation of repetitive assembly tasks in factories, where the complexity and ROI was most clear. Less repetitive tasks require more sophisticated automation and sometimes carry less business value. Overall this means that automation will take over slowly, not quickly.

How Cloud Computing Changes Things

If we wait for companies like ABB, General Electric, and Siemens to customize robotic systems for us in millions of different applications, the mobile industry will starve to death while waiting for the IoT market. However, Cloud Computing can add tremendous value for automation, because application developers can create the automation algorithms for various tasks, for use in multiple different companies and industries. Instead of developing each program separately, the work could be shared among multiple customers.

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Imagine every brewery in the world using a common software-based algorithm to verify that labels are positioned correctly on each bottle of beer. Thousands of small breweries that previously handled this task manually would benefit from a simple app found online. Notably, the bottling machines used by thousands of breweries are built by only a few manufacturers, so interfaces with the heavy equipment would not present a huge challenge to the app developer.

Many industries would follow a similar profile: There are hundreds or thousands of customers, most of which have needs for exactly the same automation task. The value of Cloud Computing comes from connecting all of these customers with an online "app store" that can handle the automation for them.

Edge Computing Makes It Local

Many industrial companies would benefit from a cloud-based library of automation apps, but in fact they would not be willing to use an Internet-based service to actually control their production line. The plant manager would only accept a solution that he/she can control directly—no surprise software updates, no shutdowns when connectivity is poor, etc.

This means that on-premises edge computing has a place in the automation story. Following our example of the beer-bottling label checks, we need a camera to monitor every label and some video analytics to determine whether labels are straight. The analytics can run on a standard Dell or HP server in the brewery, so the investment is minimal for the hardware. The application can be made available over the Internet for whichever bottling machine is used at the brewery, and a simple line shut-down can be implemented whenever the labels are crooked.

The requirement for the data to "stay local" has implications for the network as well. Using the public LTE or 5G network to connect IoT devices or broadband devices would not be acceptable in some cases, so there's a need for on-premises network equipment that is configured (with EPC or 5G core resources) to live completely within the corporate firewall. This kind of solution is not widely available yet, as OEMs providing the networks are still more focused on serving operators with public wide-area networks.

Case Study: ROI for on-premises Edge Computing

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Many industrial companies would benefit from a cloud-based library of automation apps, but in fact they are not equipped to set up their own Private LTE or Private 5G network. They need somebody with spectrum to help. They need somebody with experience in managing a mobile network to set the network up. A clear opportunity is growing for companies like Nokia and Ericsson to step in and set up curated networks on behalf of manufacturing companies or other industrial companies that require a combination of reliable connectivity and edge analytics/automation.

In our case study, we considered a nationwide program where a spectrum owner (this could be a mobile operator or a neutral CBRS PAL license holder) to manage networks on behalf of industrial businesses.

Assumptions:

- 10,000 enterprises need security or video analytics
- 2,000 enterprises need manufacturing inspection analytics
- 1.000 transportation hubs such as ports, rail yards, airports need tracking and surveillance
- 5,000 other industrial customers need customized process controls or other on-premises edge computing
- Assume $5,000 cost per network access point for all private mobile network costs and 5 APs per location on average
- Assume $20,000 per location for hardware and software associated with on-premises edge computing
- Assume $2,250 per year in maintenance costs per location
- Assume $600 to $3,000 per month in fees for connectivity and analytics handled through the managed service.

It sounds like a buzzword, but we could call this kind of service an "edge computing as a service" business model which would enable thousands of companies to take advantage of technology without a need to re-invent the technology. The outcome of this kind of initiative would include:

1. Total cost of ownership for 18,000 enterprise sites of $1.1B
2. Revenue over an 8-year period for the managed service in the range of $2.5B
3. Overall return on investment (IRR) of 30% or more

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Figure 2: ROI for 18,000 on-premises Private LTE/Edge Computing systems

Sources: Mobile Experts

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